



The Hemlock Woolly Adelgid, A Pest We CAN Manage!

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Eastern hemlock trees of all shapes and sizes are currently being killed by an invasive non-native insect called the Hemlock Woolly Adelgid (*Adelges tsugae*, or HWA). HWA looks like a tiny ball of cotton attached to twigs at the base of needles on Hemlock trees (Figure 1). This is because this tiny aphid-like insect produces a dense mass of waxy hairs to protect it. An interesting aspect of its biology is that it actually grows during the winter and through to

early summer, a time when predators are not usually present. During summer and early fall it is very tiny, without the waxy fluff, and settled on the twigs waiting for the end of fall when it will begin

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development and production of the waxy fibers covering its body. The best time for detection is between February and June. You can see it by looking at the underside of twigs on hemlock branches. Dispersal of HWA is limited to the period from late March to early July so if you are working with infested trees take care to clean your equipment so you do not cause its spread.



Figure 1. Hemlock Woolly Adelgid, *Adelges tsugae*, on an Eastern hemlock twig. © Mark Whitmore

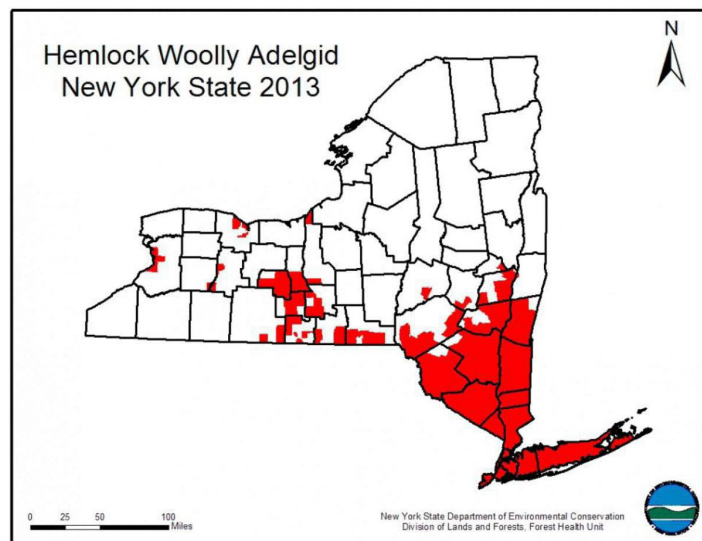


Figure 2. Current distribution of Hemlock Woolly Adelgid in New York State towns. Scott McDonnell, NYSDEC, Forest Health Unit.

HWA was first found to be killing trees near Richmond, VA in the mid 1950s it has spread throughout the East coast from Georgia to southern Maine killing vast numbers of hemlocks in its wake. HWA has been spreading through New York since the late 1980s, starting in the lower Hudson Valley (Figure 2). HWA's spread has increased in the past few years, perhaps aided by some mild winters. Cold temperatures have been documented as responsible for killing significant numbers of HWA and have been thought to be regulating its march northward in New England. HWA cannot avoid cold because once they settle on a twig and begin feeding they will not move for the rest of their life. However, they are protected somewhat from wind-chill by the woolly wax they produce that surrounds their body.

A recent laboratory study demonstrated that HWA from the Berkshire Mountains suffered 97% mortality at -22°F (-30°C) and none survived -31°F (-35°C). These lowest temperatures are not common in most of New York (Figure 3), but lab studies don't

always tell the whole story when you get out in the woods. To get an idea what is going on outside the lab we recently sampled two sites that have been harboring HWA for a few years. At Taughannock State Park near Cayuga Lake, according to our instruments the

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temperature never got below -8°F (-22°C) yet we found HWA mortality to be about 92%. On the other hand, at Mine Kill State Park in the northern Catskills temperatures got to -24°F (-31°C) and we found only about 81% mortality. Wait a minute, there is more mortality where it is warmer? There are two things going on here: 1) HWA reproduce asexually and have a very high reproductive rate so all you need is a few to survive the cold and the population is off and growing; and 2) perhaps more troubling is that research

indicates cold tolerance is a genetically linked trait so progeny of the survivors will also be cold tolerant. The Mine Kill SP data suggests HWA populations in colder areas are indeed becoming more cold tolerant than those in warmer locations like Taughannock SP. However, getting a high percentage kill will knock back the HWA population in an area for a couple years but they will quickly rebound. Reduced density of HWA means there is less competition and the food quality of hemlock twigs will be degraded more slowly, basically giving the surviving HWA a fertile field for reproduction, and they can do that rapidly.

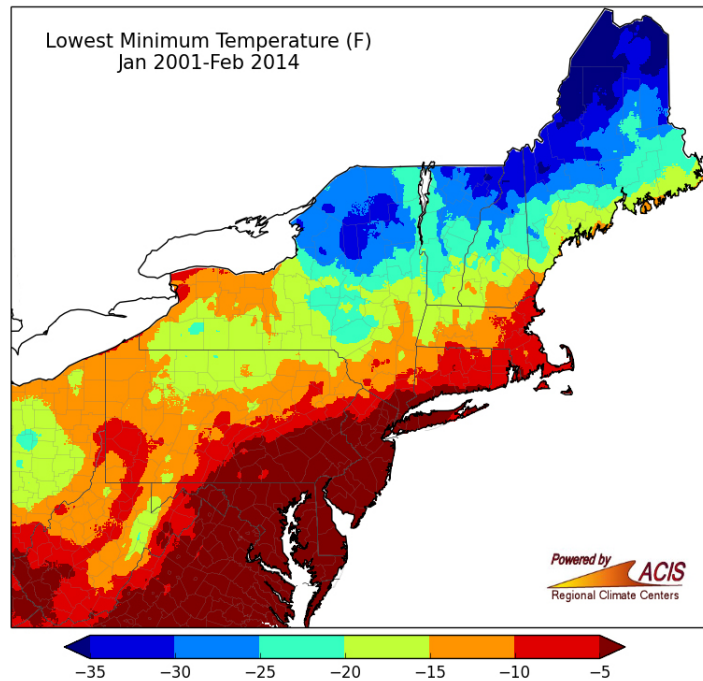


Figure 3. Lowest temperatures recorded in the Northeast from January 2001 to February 2014 in degrees Fahrenheit. Northeast Regional Climate Center, Cornell University, Feb 2014.

Given that last winter's cold weather wasn't enough to eliminate all the hemlock woolly adelgids, what options do we have to control this pest? We have time to act, in many cases even trees that have thin canopies can be brought back to full health. There are two pesticides currently being used for HWA in New York, Imidacloprid and Dinotefuran. One of the most important things to know is that treatments with Imidacloprid (active ingredient) have been found to be effective up to 7 years. Imidacloprid products are labeled to be applied by soil drench, soil injection, time-release soil tablets (Core Tect), or trunk injection. Recently, based on the work of Dr.

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Rich Cowles at the Connecticut Agricultural Experiment Station, we obtained 2(ee) recommendations from NYSDEC for basal bark spray applications of Imidacloprid. Basal bark sprays are applied at the same rate as other application methods but the liquid is sprayed on the bark of the basal 5 feet or so of the tree to the point just before it begins to drip. Currently we have 2(ee) recommendations for Merit 2F, Bandit 2F, AmTide 2F, and PrimeraOne 2F. The only Imidacloprid formulation available to homeowners is a soil drench; all others are regulated and must be applied by registered pesticide applicators. Be aware that a soil drench could possibly move through a porous soil and get into waterways. It's best not to use the soil

drench within 75 feet of any body of water. Soil drench works best when the soil is moistened after a rainstorm, not when it is dry. The advantage of the professionally applied time-release soil tablets is that because the active ingredient (imidacloprid) is released over a two year period, twice as many trees can be treated in a given area at the same time.

One of the drawbacks to Imidacloprid is that it moves slowly into the tree and it may take up to a year to see the results of treatment. This presents a problem to older trees in particular because they may have impaired vascular systems and may not be able to move the product into the crown fast enough to survive. A

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recent development in New York is the Special Local Need (SLN) registration of Dinotefuran (active ingredient), under the trade name Safari, to be used as a basal bark spray. This is significant because Safari moves much more rapidly than Imidacloprid into the tree canopy, but the drawback is that its efficacy is limited to only a single year. We recommend that Safari be used for older trees and any tree that has severe crown thinning. In these circumstances it is used to rapidly reduce HWA so the trees can recover and have time to take up Imidacloprid for more long-term protection. With the 2(ee) recommendation of Imidacloprid products for basal bark spray it is now possible to apply both pesticides at the same time with a tank mix. Safari is a regulated pesticide and must be applied by registered pesticide applicators.

A bright spot in the HWA story is the glimmer of hope that biological control agents may actually be successful. Work begun in North Carolina 10 years ago with the release of the predator *Laricobius nigrinus* (Coleoptera: Derodontidae) from the Pacific Northwest is finally showing promise with large numbers of predators recovered and an apparent recovery in the crowns of residual hemlocks. We have released small numbers of *L. nigrinus* at 14 locations in New York over the past 5 years and have recovered them at two sites. Supplies of this predator are very limited and available for experimental use only. We are currently investigating methods of rearing predators at multiple locations in the state. It will take years for the populations to build to the point that they will be able to control HWA. Therefore it's important to act and keep hemlocks alive on the landscape until biocontrol can take over.

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For more information go to the insect section and find Hemlock Woolly Adelgid at: www.nyis.info